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and involving star 12, and also a horn-like projection in the direction of star *l*. There are also streaky masses of nebulosity trending north and south, filling the space between *Maia*, *Electra*, and *Merope*. There is a remarkable absence of symmetry between these nebulæ, that leads us to infer that we are looking at a number of separate nebulæ one behind the other in the line of sight, and two of them, which the nebulous straight lines represent, are seen edgewise. Many stars are visible through even the densest nebulosities.

We shall henceforward be able to study these objects by aid of reliable data when verbal or written descriptions will be better understood in giving the results of generalisations.

Nebula in Andromeda.

The accompanying photograph was taken on December 29, 1888, and is enlarged to three times the negative. The exposure was during four hours, and it confirms the various details shown upon the first photograph, which was presented to the Society at the last meeting, besides bringing to sight more clearly, by reason of the longer exposure, details that were either faint or absent upon the first. I am engaged in measuring the distances and angles between certain stars and the nuclei of the three nebulæ, together with the positions of some of the well-defined bright parts of the rings of the great nebula, so that in future any movement, orbital or otherwise, in their relative positions may be detected. When the measurements are completed they shall be presented to the Society.

The Surface of the Sun in 1888. By the Rev. S. J. Perry.

A few words will suffice to tell the history of solar changes during the past twelve months. More free from spots than in any previous year of the present decade, the Sun has still shown some signs of vigour and activity. On 241 days of the year observations were secured at Stonyhurst, and out of these the surface was found to be entirely free from spots on 102 days, and even faculæ were totally absent on 6 days. Throughout the year the faculæ were generally scarce and faint, but, when the definition was fairly good, it seldom happened that a few scattered bright markings could not be detected, although it might sometimes require a careful search to find them. Occasionally, however, a few bright scattered faculæ near the poles were the most striking feature of the Sun's surface. Comparing this year with those immediately preceding it, we find the percentage of spotless days to be greatly on the increase, having been 9·42 in 1886, 29·73 in 1887, and 42·32 in 1888. The greatest number of consecutive days during this minimum period, on which the spot-area never exceeded the one hundred thousandth part of the

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visible hemisphere, was from May 24 to August 27, 1888, and the next longest succession of almost spotless days occurred during the autumn of 1886. In the month of January the solar disturbances consisted of small round spots of the normal type, but for the rest of the year small groups were more common than isolated spots, the principal member of the group being almost invariably followed by a number of lesser companions. In general, the spots did not last long, being for the most part very shallow disturbances.

Watching the general surface on days when the definition is unusually perfect, there does not seem to be much change from year to year, nor is there even a very marked difference between the appearance at a maximum and at a minimum period. The veiled spots continue to show themselves with great persistency in every portion of the surface, and the character and rapidity of their changes appear to be unaffected by the causes that produce the variations in the solar cycle. The sub-permanent veiled-spots, seen only within the spot-zones, have not been recorded more than twice or thrice during the last twelve months; but the slight penumbral markings, which start as ill-defined dots, and, quickly spreading out, congregate in considerable numbers so as to form large blurred patches, have often been seen most distinctly. The darkness of the shade in these markings is sometimes much more intense than usual, and not unfrequently these darker-veiled spots are observed in large numbers in the neighbourhood of scattered faculæ.

An observation of some importance was made on the day preceding the closing day of the year, and which I may perhaps be allowed here to recall, as it seems to indicate the commencement of a fresh solar cycle. The observation was the record of a small group of spots in the high latitude of 36° S, whereas spots have of late been confined within a rather narrow equatorial zone. If this group proves to be the forerunner of other spots similarly situated, we have fair grounds for concluding that a continual decrease in the mean spot-area, until the end of the present year, will be followed in 1890 by a rapid increase in the number and extent of solar disturbances.

Stonyhurst Observatory:
1889, *January* 9.

Photographs of the Red End of the Solar Spectrum from the Line (D) to the Line (A) in Seven Sections. Taken by F. McClean, M.A., F.R.A.S.

The accompanying photographs represent the red end of the solar spectrum from Fraunhofer line (D) to Fraunhofer line (A).

They comprise just one half of the visible spectrum from the line (H) to the line (A).

Dr. Rowland's published photographs of the solar spectrum

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